

CLAIMS:

1. A method comprising:

generating a first gray element based on an estimated gamma for a green
5 channel of a display device;

generating a set of red-blue shifted gray elements that represent shifts in the red
channel, blue channel, or a combination of the red and blue channels away from the first
gray element; and

estimating a gray balance of the display device based on user selection of one of
10 the gray elements that appears to most closely blend with a gray background.

2. The method of claim 1, further comprising characterizing the
colorimetric response of the display device based on the estimated gamma and
estimated gray balance.

3. The method of claim 1, further comprising:

selecting one of a plurality of green elements displayed by a display device that
appears to most closely blend with a dithered green background; and

estimating the gamma for the green channel of the display device based on the
20 selected green element.

4. The method of claim 1, the method further comprising:

modifying a color image based at least in part on the estimated gray balance; and
delivering the modified color image to the display device.

5. The method of claim 1, wherein the display device is associated with a
client residing on a computer network, the method further comprising:

transmitting information representing the estimated gray balance to a remote
server on the network;

30 modifying the color image at the remote server based on the information; and

delivering the modified color image to the client via the computer network for display on the display device.

5 6. The method of claim 1, further comprising determining the estimated gamma by:

 selecting one of a first plurality of green elements displayed by the display device that appears to most closely blend with the dithered green background;

 estimating a coarse gamma for the display device based on the selected one of the first plurality of green elements;

10 selecting one of a second plurality of green elements displayed by the display device that appears to most closely blend with the dithered green background, wherein the second plurality of green elements includes the selected one of the first plurality of green elements; and

 estimating a fine gamma for the display device based on the selected one of the second plurality of green elements, wherein the estimated fine gamma is the estimated gamma.

15
20 7. The method of claim 6, wherein the first plurality of green elements represent greater gradations in green intensity than the second plurality of green elements.

25 8. The method of claim 1, further comprising displaying the first gray element in a substantially central position relative to the red-blue shifted elements, wherein the first gray element includes substantially equal red, green, and blue values based on the estimated gamma for the green channel.

30 9. The method of claim 1, wherein the red-blue shifted elements do not represent any substantial shift in green away from the color value of the selected green element.

5

5

10

15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845. 846. 847. 848. 849. 850.

15

三

10

Figure 1

20

25

25

16. A system comprising:

a web server residing on a computer network, the web server transmitting web pages to remote clients residing on the computer network;

a color image server residing on the computer network, the color image server transmitting color images referenced by the web pages to the clients for display on display devices associated with the clients;

a color profile server residing on the computer network, the color profile server guiding the clients through a color profiling process to obtain information characterizing the color responses of the display devices associated with the clients, wherein the information includes a gray balance for each of the display devices, and the color profiling process includes:

displaying a first gray element based on an estimated gamma for the green channel of the display device,

displaying a set of red-blue shifted gray elements that represent shifts in the red channel, blue channel, or a combination of the red and blue channels away from the first gray value,

selecting one of the gray values that appears to most closely blend with a gray background, and

estimating the gray balance of the display device based on the selected gray element; and

one or more color correction modules that modify the color images transmitted by the color image server based on the information to improve the accuracy of the color images when displayed on the respective display device.

17. The system of claim 16, wherein the color image server stores the information to the client in a web cookie, the client transmits the web cookie from the client to the server, and the color image server modifies the color image via the server based on the contents of the web cookie.

18. The system of claim 16, wherein the color profiling process includes:

selecting one of a plurality of green elements displayed by a display device that appears to most closely blend with a dithered green background; and

estimating the gamma for the green channel of the display device based on the selected green element.

5

19. The system of claim 16, wherein the color profiling process includes determining the estimated gamma by:

10 selecting one of a first plurality of green elements displayed by the display device that appears to most closely blend with the dithered green background;

estimating a coarse gamma for the display device based on the selected one of the first plurality of green elements;

15 selecting one of a second plurality of green elements displayed by the display device that appears to most closely blend with the dithered green background, wherein the second plurality of green elements includes the selected one of the first plurality of green elements; and

20 estimating a fine gamma for the display device based on the selected one of the second plurality of green elements, wherein the estimated fine gamma is the estimated gamma.

20. The system of claim 19, wherein the first plurality of green elements represents greater gradations in green intensity than the second plurality of green elements.

25 21. The system of claim 16, wherein the color profiling process includes displaying the first gray element in a substantially central position relative to the red-blue shifted elements, wherein the first gray element includes substantially equal red, green, and blue values based on the estimated gamma for the green channel.

30

22. The system of claim 16, wherein the red-blue shifted elements do not represent any substantial shift in green away from the color value of the selected green element.

5 23. The system of claim 16, wherein the estimated gamma is limited to only the green channel.

24. The system of claim 16, wherein the color profiling process includes:
estimating the blackpoint of the display device; and
10 including with the information the estimated gamma and estimated blackpoint.

25. The system of claim 16, wherein the gray background is a dithered approximately 33% gray background.

15 26. The method of claim 16, wherein the display device is associated with a client on a computer network, the method further comprising guiding the client through the process of obtaining the estimated gray balance by delivering one or more instructional web pages to the client.

20 27. A computer readable medium containing instructions that cause a programmable processor to:

generate a first gray element based on an estimated gamma for a green channel of a display device;

25 generate a set of red-blue shifted gray elements that represent shifts in the red channel, blue channel, or a combination of the red and blue channels away from the first gray element; and

generate a gray balance of the display device based on user selection of one of the gray elements that appears to most closely blend with a gray background.

28. The computer readable medium of claim 27, wherein the instructions cause the processor to characterize the colorimetric response of the display device based on the estimated gamma and estimated gray balance.

5 29. The computer readable medium of claim 27, wherein the instructions cause the processor to:

select one of a plurality of green elements displayed by a display device that appears to most closely blend with a dithered green background; and

10 estimate the gamma for the green channel of the display device based on the selected green element.

30. The computer readable medium of claim 27, wherein the instructions cause the processor to:

modify a color image based at least in part on the estimated gray balance; and deliver the modified color image to the display device.

31. The computer readable medium of claim 27, wherein the display device is associated with a client residing on a computer network, and the instructions cause the processor to:

20 transmit information representing the estimated gray balance to a remote server on the network;

modify the color image at the remote server based on the information; and

deliver the modified color image to the client via the computer network for display on the display device.

25 32. The computer readable medium of claim 27, wherein the instructions cause the processor to determine the estimated gamma by:

selecting one of a first plurality of green elements displayed by the display device that appears to most closely blend with the dithered green background;

30 estimating a coarse gamma for the display device based on the selected one of the first plurality of green elements;

selecting one of a second plurality of green elements displayed by the display device that appears to most closely blend with the dithered green background, wherein the second plurality of green elements includes the selected one of the first plurality of green elements; and

5 estimating a fine gamma for the display device based on the selected one of the second plurality of green elements, wherein the estimated fine gamma is the estimated gamma.

10 33. The computer readable medium of claim 32, wherein the first plurality of green elements represent greater gradations in green intensity than the second plurality of green elements.

15 34. The computer readable medium of claim 27, wherein the instructions cause the processor to display the first gray element in a substantially central position relative to the red-blue shifted elements, wherein the first gray element includes substantially equal red, green, and blue values based on the estimated gamma for the green channel.

20 35. The computer readable medium of claim 27, wherein the red-blue shifted elements do not represent any substantial shift in green away from the color value of the selected green element.

25 36. The computer readable medium of claim 27, wherein the estimated gamma is limited to only the green channel.

30 37. The computer readable medium of claim 27, wherein the instructions cause the processor to:

 estimate the blackpoint of the display device; and
 characterize the colorimetric response of the display device based on the estimated gamma, blackpoint, and gray balance.

38. The computer readable medium of claim 37, wherein the display device is associated with a client residing on a computer network, and the instructions cause the processor to:

transmit information representing the estimated blackpoint, gamma, and gray balance to a remote server on the network;
modify the color image at the remote server based on the information; and
deliver the modified color image to the client via the computer network for display on the display device.

39. The computer readable medium of claim 37, wherein the instructions cause the processor to:

modify a color image based on the estimated blackpoint, gamma, and gray balance; and
deliver the modified color image to the display device.

40. The computer readable medium of claim 27, wherein the gray background is a dithered approximately 33% gray background.

41. The computer readable medium of claim 27, wherein the display device is associated with a client on a computer network, and the instructions cause the processor to guide the client through the process of obtaining the estimated gray balance by delivering one or more instructional web pages to the client.

42. The computer readable medium of claim 27, wherein the instructions are contained both in physical data storage media and signals transmitted between the client and other resources on the computer network.